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## Investigation of the Quaternary History of the Colorado River Using Cosmogenic Radionuclides

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### Abstract

Cosmic-ray-produced radionuclides in surface samples are being used to investigate the emplacement of colluvial deposits in the eastern Grand Canyon, between Lee's Ferry and Unkar Creek. The surfaces in this reach of the Colorado River are formed by debris flows on tributary washes. Downcutting of the Colorado River punctuated by periods of stasis or aggradation results in the formation of multiple terraces in which the lowest levels are the youngest. These surfaces are mantled by locally derived rocks, many of which contain chert. Cosmogenic  $^{10}\text{Be}$  and  $^{26}\text{Al}$  are produced by cosmic ray interactions in chert so these samples should provide an opportunity to establish a chronology for the debris flows in this portion of the Grand Canyon. In addition to the samples collected for cosmogenic radionuclide measurements, soil samples were also obtained from most surfaces. Cosmogenic radionuclide exposure ages from these surfaces provide us the means to constrain models of carbonate formation.

In the samples analyzed to date we have demonstrated that chert is a suitable mineral for surface exposure dating. The surfaces have exposure ages ranging from <2000 a to > 100 ka in which the lowest level surfaces are the youngest. Based on the ages of the youngest surfaces and on the overall consistency of the surface exposure ages we believe that most samples do not contain inherited cosmogenic  $^{10}\text{Be}$  and  $^{26}\text{Al}$ . The older surfaces show evidence of degradation and yield exposure ages less than would be indicated by their stratigraphic level.

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